REQ. AGENT	RAND NO.	ACQ. AGENT
BER	V0184	YPS
SAR	V0322	CYN

NIMBUS 7

ERB DELMAT

78-098A-07H

THIS DATA SET CATALOG CONSISTS OF 107 ERB DELMAT TAPES. THEY ARE 9-TRACK, 1600 BPI, AND WERE CREATED ON AN IBM 3081 COMPUTER. THE TAPES ARE MULTI-FILED, THE FIRST BEING AN EBCDIC HEADER FILE, FOLLOWED BY BINARY DATA FILES AND ENDING WITH AND EBCDIC TRAILER DOCUMENTATION FILE. DOCUMENTATON FOR THIS DATA SET CAN BE FOUND IN THE FILING CABINET. THE D AND C NUMBERS, ALONG WITH THE TIME SPANS ARE AS FOLLOWS:

D#	C#	FILES	TIME SPAN
D-79697	C-27213	14	11/01/78 - 12/05/78
D-79698	C-27214	26	12/01/78 - 01/05/79
D-79670		25	01/01/79 - 02/05/79
D-79671		23	02/01/79 - 03/05/79
D-79672		28	03/01/79 - 04/05/79
D-79673		25	04/01/79 - 05/05/79
D-79674		28	05/01/79 - 06/05/79
D-79675		28	06/01/79 - 07/05/79
D-79676		29	07/01/79 - 08/05/79
D-79677		29	08/01/79 - 09/05/79
D-79678		28	09/01/79 - 10/05/79
D-79679		26	10/01/79 - 11/05/79
D-79680		28	11/01/79 - 12/05/79
D-79681		27	12/01/79 - 01/05/80
D-79696	C-27212	29	01/01/80 - 02/05/80
D-79693	C-27209	27	02/01/80 - 03/05/80
D-79694	C-27210	28	03/01/80 - 04/05/80
D-79691	C-27207	27	04/01/80 - 05/05/80
D-79692	C-27208	29	05/01/80 - 06/05/80
D-61720 **	C-23848	26	06/01/80 - 07/05/80
D-61721 **	C-23849	29	07/01/80 - 08/05/80
D-61722 **	C-23850	29	08/01/80 - 09/05/80
D-61723 **	C-23851	28	09/01/80 - 10/05/80
D-61724 **	C-23852	29	10/01/80 - 11/05/80
D-63227 *	C-24042	29	11/01/80 - 12/05/80
D-63228 *	C-24043	29	12/01/80 - 01/05/81
D-63229 *	C-24044	29	01/01/81 - 02/05/81
D-63230 *	C-24045	27	02/01/81 - 03/05/81

* THESE TAPES WERE REPLACED ON 07/26/88
** THESE TAPES WERE REPLACED ON 07/20/89

ERB DELMAT 78-098A-07H

D#	C#	FILES	TIME SPAN
D-63231 *	C-24046	29	03/01/81 - 04/05/81
D-63232 *	C-24047	28	04/01/81 - 05/05/81
D-63233 *	C-24048	29	05/01/81 - 06/05/81
D-63234 *	C-24049	29	06/01/81 - 07/05/81
D-63235 *	C-24050	29	07/01/81 - 08/05/81
D-63236 *	C-24051	29	08/01/81 - 09/05/81
D-63237 *	C-24052	29	09/01/81 - 10/05/81
D-63238 *	C-24053	29	10/01/81 - 11/05/81
D-65147 *	C-24567	28	11/01/81 - 12/05/81
D-65148 *	C-24568	29	12/01/81 - 01/05/82
D-65149 *	C-24569	29	01/01/82 - 02/05/82
D-65150 *	C-24570	27	02/01/82 - 03/05/82
D-65151 *	C-24571	29	03/01/82 - 04/05/82
D-65152 *	C-24572	29	04/01/82 - 05/05/82
D-65153 *	C-24573	29	05/01/82 - 06/05/82
D-65154 *	C-24574	28	06/01/82 - 07/05/82
D-65155 *	C-24575	28	07/01/82 - 08/05/82
D-65156 *	C-24576	28	08/01/82 - 09/05/82
D-65157 *	C-24577	28	09/01/82 - 10/05/82
D-65158 *	C-24578	29	10/01/82 - 11/05/82
D-65159	C-24579	28	11/01/82 - 12/05/82
D-65160	C-24580	29	12/01/82 - 01/05/83
D-65161	C-24581	29	01/01/83 - 02/05/83
D-65162	C-24582	27	02/01/83 - 03/05/83
D-65163	C-24583	29	03/01/83 - 04/05/83
D-65164	C-24584	28	04/01/83 - 05/05/83
D-65165	C-24585	29	05/01/83 - 06/05/83
D-65166	C-24586	28	06/01/83 - 07/05/83
D-65167	C-24587	29	07/01/83 - 08/05/83
D-65168	C-24588	29	08/01/83 - 09/05/83
D-65169	C-24589	34	09/01/83 - 10/05/83
D-65170	C-24590	38	10/01/83 - 11/05/83
D-73103	C-25691	37	11/01/83 - 12/06/83
D-73104	C-25692	38	12/01/83 - 01/06/84
D-73105	C-25693	38	01/01/84 - 02/06/84
D-73106	C-25694	37	02/01/84 - 03/07/84
D-73107	C-25695	38	03/01/84 - 04/06/84
D-73108	C-25696	32	04/01/84 - 05/05/84
D-73109	C-25697	29	05/01/84 - 06/06/84
D-73110	C-25698	29	06/01/84 - 07/05/84
D-73111	C-25699	29	07/01/84 - 08/06/84
D-73112	C-25700	29	08/01/84 - 09/06/84
D-73113	C-25701	29	09/01/84 - 10/05/84
D-73114	C-25702	31	10/01/84 - 11/06/84
D-73211	C-25762	37	11/01/84 - 12/05/84
D-73141	C-25727	38	12/01/84 - 01/05/85
D-73142	C-25728	38	01/01/85 - 02/06/85
D-73212	C-25763	35	02/01/85 - 03/05/85

* THESE TAPES WERE REPLACED ON 07/26/88

ERB DELMAT 78-098A-07H

D#	C#	FILES	TIME SPAN
D-72843	C-25581	38	03/01/85 - 04/05/85
D-73143	C-25729	37	04/01/85 - 05/06/85
D-73213	C-25764	38	05/01/84 - 06/05/85
D-73144	C-25730	37	06/01/85 - 07/06/85
D-73145	C-25731	38	07/01/85 - 08/06/85
D-73146	C-25732	38	08/01/85 - 09/05/85
D-73147	C-25733	37	09/01/85 - 10/06/85
D-73148	C-25734	38	10/01/85 - 11/06/85
D-73478	C-25921	37	11/01/85 - 12/05/85
D-73750	C-25941	38	12/01/85 - 01/06/86
D-73505	C-25925	38	01/01/86 - 02/06/86
D-74115	C-26119	35	02/01/86 - 03/05/86
D-74116	C-26120	38	03/01/86 - 04/05/86
D-74117	C-26121	11	04/01/86 - 05/05/86
D-74466	C-26201	14	06/01/86 - 07/05/86
D-74468	C-26209	38	07/01/86 - 08/05/86
D-74504	C-26215	38	08/01/86 - 09/05/86
D-74929	C-26336	37	09/01/86 - 10/05/86
D-74928	C-26335	38	10/01/86 - 11/05/86
D-75497	C-26400	37	11/01/86 - 12/04/86
D-78688	C-26783	35	12/01/86 - 01/05/87
D-78689	C-26789	38	01/01/87 - 02/05/87
D-78690	C-26785	35	02/01/87 - 03/05/87
D-78691	C-26786	38	03/01/87 - 04/05/87
D-78692	C-26787	30	04/01/87 - 05/05/87
D-78960	C-26850	20	05/01/87 - 06/05/87
D-79695	C-27211	19	06/01/87 - 07/05/87
D-79682		20	07/01/87 - 08/05/87
D-79700	C-27216	29	08/01/87 - 09/05/87
D-79701	C-27217	37	09/01/87 - 10/05/87
D-79699	C-27215	38	10/01/87 - 11/05/87

B R I E F D E S C R I P T I O N
Post MAT Calibration Tape(DELMAT)
78-098A-07H

The Nimbus-7 DELMAT data set contains calibration adjustments for the correction of earth radiances measured by the wide-field-of-view channels on the Earth Radiation Budget (ERB) instrument. New calibration adjustment algorithms were developed after the scanner failed 20 months after launch. In addition to the calibration adjustments, the data set contains the uncorrected and corrected irradiances. Designed to complement rather than replace the Master Archival Tapes (MAT; NSSDC ID 78-098A-07A), the DELMAT is supplied by the Nimbus Project on one IBM magnetic tape per month.

M A T E R I A L S F O R D I S T R I B U T I O N
78-098A-07H
Post MAT Calibration Tape(DELMAT)

User's Guide and tape specification for ERB-7 DELMAT, NASA/CR-175299 (3/85), B36697-000A.

A C K N O W L E D G E M E N T S

When using the data in any reports, publications, or presentations, please acknowledge the National Space Science Data Center and the following individuals or groups:

78-098A-07H
Dr. H. L. Kyle, Nasa/Gsfc, Dr. Herbert Jacobowitz, Noaa/Nesdis, And Members Of The Erb Nimbus Experiment And Information Processing Teams

NASA Contractor Report 175299

User's Guide and Tape Specification for ERB 7 DELMAT

Philip Ardanuy
Lanning Penn

Prepared For:
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Prepared By:
Research and Data Systems, Inc.
10300 Greenbelt Road
Lanham, Maryland 20706
Under Contract No. NAS 5-27728
Task Assignment 3
MARCH 1985

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771

User's Guide and Tape Specification for ERB 7 DELMAT

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NIMBUS 7

EARTH RADIATION BUDGET (ERB)

DELMAT USER'S GUIDE

Part I

SECTION 1. INTRODUCTION

1.1 Purpose of the User's Guide

The DELMAT User's Guide has been written to fulfill the following objectives:

a. To provide guidance to the DELMAT user, primarily in the areas of the purpose, use, and limitations of the DELMAT tapes and software.

b. To provide the DELMAT tape specifications to the user.

c. To summarize the input MAT's and tape characteristics applicable to the DELMAT tapes.

For a description of the Nimbus-7 Earth Radiation Budget (ERB) Experiment and data products, the reader is referred to the references in section 1.2.

1.2 Project References

The Calibration Adjustment Task is performed by the ERB Processing Team under the management of Dr. H. Lee Kyle (GSFC/Code 636), with the cooperation of the Nimbus-7 ERB Experiment Team. The software has been developed for, and is operated on, the GSFC SACC computers. The following documents are references for this task:

1.2.1 Ardanuy, P.E., and J. Rea, Degradation Asymmetries and recovery of the Nimbus-7 radiation budget shortwave radiometer, J. Geophysical Research, In press, 1984.

1.2.2 Groveman, B.S., User's Guide for ERB-7 MAT, NASA Contractor Report CR 170514, Goddard Space Flight Center, 1984.

1.3 Terms and Abbreviations

ERB - Earth Radiation Budget

WFOV - Wide Field of View

BPI - Bytes Per Inch

CAT - Calibration Adjustment Table

TDF - Trailing Document File

DELMAT - MAT Monthly Calibration Adjustment Tape

PDELTA - Preliminary MAT Calibration Adjustment Tape

JCL - Job Control Language

GSFC - Goddard Space Flight Center

SACC - Science Applications Computing Center

RDS - Research and Data Systems, Inc.

NET - Nimbus Experiment Team

The DELMAT calibration adjustments are additive. Where questionable data is encountered, the DELMAT software employs interpolation algorithms (spline fit for small gaps, trend-matched zonal averages for large gaps) to replace the data. A low-pass, 3-point (.25, .50, .25) filter is also employed to identically remove an inherent every-other-observation oscillation in the data. To the user of filtered channel irradiances (total channels are unchanged) there exist three options within the DELMAT record; (1) the use of the uncorrected irradiances; (2) the use of the uncorrected irradiances with the calibration adjustments added; or (3) the use of the corrected irradiances.

Three versions of DELMAT tapes produced by three corresponding versions of DELMAT software currently exist. Version 1.0 software produced by the corresponding version of DELMAT software was used to process data from May, 1980 through October, 1981. Version 2.0 software was used to process data from November, 1981 through October, 1983. Version 3.0 software, used to process data after October, 1983, is being used to reproduce DELMAT's for the prior time period. The physical format of the three versions is presented in Part II. The differences in algorithm are discussed in Section 3.

2.2 Calibration Adjustment Table

The Calibration Adjustment Table (CAT) contains empirically determined slopes and offsets to be applied to each WFOV channel. These values are presented in writing and are applied at MATRIX-level processing.

2.3 Calibration Overview

Figure 1 displays the ERB processing steps from the initial spacecraft-transmitted data to final user products. The DELMAT and the channel 13 CAT are used in conjunction with the original MAT in level-2 processing producing SEFDT and MATRIX.

3. Summary of DELMAT Corrections

3.1 Midnight Offset

3.1.1 Description

The midnight offset correction is provided to remove the zero bias evident at night from each of the two filtered channels. A midnight point is defined for each orbit as that point in the orbit farthest from the sun (maximum solar zenith angle). At this point the calibrated signal is extracted from the shortwave and near-infrared radiometers. The former is corrected for longwave heating. In general, 13 or 14 data points (one per orbit) are obtained for each day. A cubic spline is fitted to these midnight points and evaluated at every observation during the orbits.

3.1.2 Assumptions

It is assumed that the spacing of three shortwave-heating time constants between the sunblips and the midnight points renders the shortwave heating contamination of the midnight offsets negligible. In version 3.0, these values are removed by adjusting the midnight offset correction. This removed a slight residual error. Information from adjoining days is not included in the spline fit for the day under consideration. A constant value of the midnight offset is applied prior to the first midnight point and after the last midnight point to avoid extrapolation. Estimates of longwave heating are removed from the channel 13 midnight values to yield an independent correction for zero bias. Because of the one-data-point per orbit curve fit, the smallest oscillation that can be represented has a period of two orbits; the primary correction is the removal of the ERB duty cycle.

3.2 Longwave Heating

3.2.1 Description

The longwave heating offset correction is provided to remove the variable channel 13 sensor response to infrared radiation. A constant response correction is already applied in the count-to-irradiance calibration equation. It has been shown that there is no significant "longwave leak" through the pair of Suprasil-W filter domes. Instead, the outer dome is subjected to a time-varying incident longwave radiance field, modulated primarily by the equator-to-pole terrestrial thermal gradient. This produces a temperature response in the dome

the shortwave heating correction for both channel 13 and 14 is set to zero. In version 3.0, the direct solar correction is used, while the terrestrial-reflection correction is set to zero.

3.4 Clipping

In the version 3.0 DELMAT, two additional corrections are added, and they are jointly referred to as clipping corrections. The first involves the interpolation across, or "clipping" of, all sunblips. Using a tensioned spline interpolation, channels 12, 13 and 14 are estimated for the region between solar zenith angles 90° and 121°.* The difference between these interpolated values (with all other applicable corrections applied) and the original sunblip irradiance is stored for each channel as the clipping correction. In addition, after all applicable corrections are applied, all channel 13 and 14 irradiances at solar zentih angles greater than 121° are set to zero. The difference between these corrected irradiances and zero are also stored as clipping corrections.

---

* The irradiances for all WFOV channels are reduced in the SZA region 90° to 99° to eliminate the out-of-field response observed in this region prior to using them as knots for the interpolation.

APPENDIX A

The following is a sample of the documentation available for DELMAT tapes. This information may be obtained from Dr. H. Lee Kyle, GSFC code 636.

The following MAT's were used to produce the June, 1980 DELMAT tape AJ01521-2

DATE	JULIAN DAY	SEQUENCE NUMBER
June 2, 1980	154	AC08421A3
June 3, 1980	155	AC08431A3
June 4, 1980	156	AC08441A3
June 6, 1980	158	AC08461A3
June 7, 1980	159	AC08471A3
June 8, 1980	160	AC08511A3
June 10, 1980	162	AC08531A3
June 11, 1980	163	AC08541A3
June 12, 1980	164	AC08551A3
June 14, 1980	166	AC08571A3
June 15, 1980	167	AC08611A3
June 16, 1980	168	AC08621A3
June 18, 1980	170	AC08641A3
June 19, 1980	171	AC08651A3
June 20, 1980	172	AC08661A3
June 22, 1980	174	AC08711A3
June 26, 1980	178	AC08751A3
June 27, 1980	179	AC08761B3
June 28, 1980	180	AC08771A3
June 30, 1980	182	AC08821A3
July 1, 1980	183	AC08831A3
July 2, 1980	184	AC08841A3
July 4, 1980	186	AC08861A3
July 5, 1980	187	AC08871A3

June, 1980; Sequence Number: AJ01521-2

File Number	Julian Day	Orbital Span	Physical Records	Logical Data Records	Orbital Summary Records	Daily Summary Records	Fill Data Records	Total Logical Records
1	-	HEADER	2					
2	154	8110-8123	28	5427	14	1	0	5442
3	155	8124-8137	28	5451	14	1	0	5466
4	156	8138-8150	26	5036	13	1	0	5050
5	158	8165-8178	28	5410	14	2	0	5426
6	159	8179-8192	28	5433	14	1	0	5448
7	160	8193-8206	28	5432	14	2	0	5448
8	162	8220-8233	28	5408	14	2	0	5424
9	163	8234-8247	28	5442	14	2	0	5458
10	164	8248-8261	28	5424	14	2	0	5440
11	166	8276-8289	28	5415	14	1	0	5430
12	167	8290-8302	26	5028	13	1	0	5042
13	168	8303-8316	28	5404	14	2	0	5420
14	170	8331-8344	28	5442	14	2	0	5458
15	171	8345-8358	28	5439	14	1	0	5454
16	172	8359-8371	26	5046	13	1	0	5060
17	174	8386-8399	26	5031	14	1	0	5046
18	178	8442-8454	23	4576	13	1	0	4590
19	179	8455-8468	28	5387	14	1	0	5402
20	180	8469-8482	27	5371	14	1	0	5386
21	182	8497-8510	28	5431	14	1	0	5446
22	183	8511-8523	26	5039	13	2	0	5054
23	184	8524-8537	28	5433	14	1	0	5448
24	186	8552-8565	28	5448	14	2	0	5464
25	187	8566-8579	27	5368	14	2	0	5384
26	-	TDF	36					

Appendix B

Internal Project References

B.1 "Nimbus-7, Nimbus Observation Processing System (NOPS) Requirements Document #NG-13 Tape Specifications No. T1B4081 ERB MAT, ERB MASTER ARCHIVAL TAPE", Goddard Space Flight Center.

B.2 "The Nimbus-7 User's Guide", the Landsat/Nimbus Project, Goddard Space Flight Center.

B.3 "Federal Information Processing Standards", FIPS Publication 38, National Bureau of Standards, Feb. 15, 1976.

B.4 "The Channel 13 Dome Heating Problem", Giannola, R. J. JaFolla and F. House, Minutes of the Ninth ERB Science Team Meeting, Attachment H, December 1977.

B.5 "Channels 13 and 14 Dome Heating Problem", Giannola R. and F. House, Minutes of the Tenth ERB Science Team Meeting. Attachment L, March 1978.

B.6 "Sunblip and Dome Heating Considerations", Giannola, R. and F. House, Minutes of the Thirteenth ERB Science Team Meeting, Attachment G, April 1979.

B.7 "Untitled Progress Report", Giannola, R. and F. House, Minutes of the Fifteenth ERB Science Team Meeting, Attachment H, January, 1980.

B.8 "Study of the Dome Heating Problem and Science Support of the Nimbus ERB Reprocessing Team", House, F., Technical Proposal submitted to Goddard Space Flight Center, September 1981.

B.18 "Nimbus-7, Nimbus Observation Processing System (NOPS), ERB MATRIX Modification for DELMAT Acceptance", Yang, C. and J. Neuberger, Systems and Applied Sciences Corp., October, 1982.

B.19 "Nimbus-7 ERB MAT Calibration Adjustment Task, DELTA MAT Program Specifications", Ardanuy, P., October, 1982.

B.20 "Report to the Nimbus ERB NET Working Meeting, November 27-28, 1984". Ardanuy, P., Groveman, B., Hucek, R., Penn, L., Weiss, M. et al., November, 1984.

NIMBUS-7

NIMBUS OBSERVATION PROCESSING SYSTEMS (NOPS)

TAPE SPECIFICATION NO. T-13401

ERB DELMAT

ABSTRACT

The ERB DELMAT TAPE is generated by software residing on an IBM 3081 computer and is created as a 9 track 1600 BPI product. It is composed of a set of files; the first file contains the standard header record written twice, the last file contains all the trailing documentation records and each intermediate file will contain one day of data. A tape length calculation is provided in Appendix A.

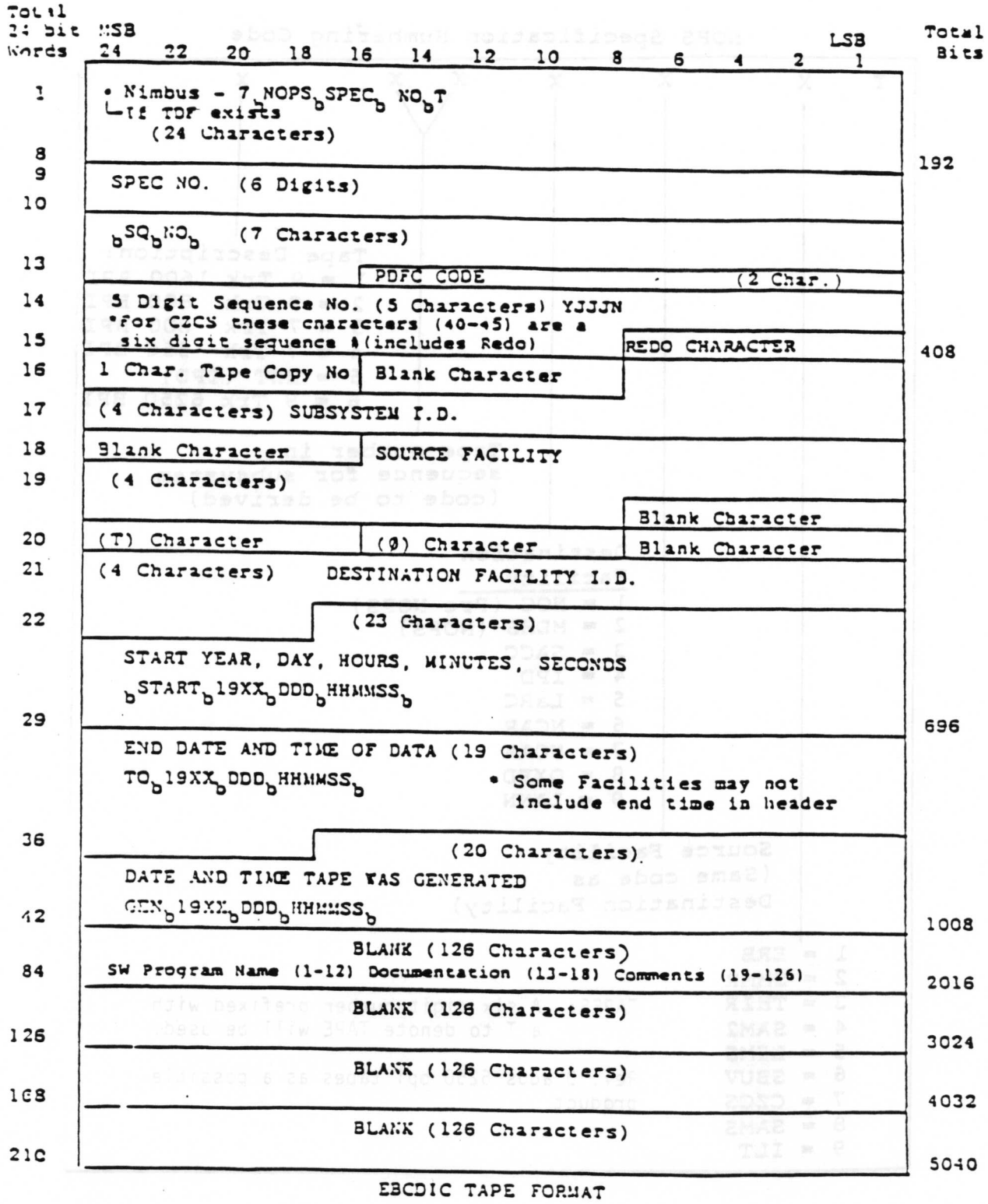
This tape has been generated in a manner so as to facilitate processing with the MAT data. The following differences and similarities are worth noting:

1. Word 1, while containing data unique to this product, is identical in format to word 1 of each MAT logical record.

2. The MAT data file (file 2) contains several thousand physical records. Each MAT physical record contains two logical records, corresponding to up to two VIP major frames (16 seconds) of data.

3. Except for the first and last files, each DELMAT tape file contains approximately 30 physical records. Each physical record (24,084 bytes) contains 100 logical records. Each logical record (240 bytes) corresponds to a single physical record on the appropriate MAT. The last 84 bytes are spares and contain no useful information. For DELMAT versions 1.0 and 2.0, each physical record contains 24,084 bytes and each logical record 240 bytes. For version 3.0, each physical record contains 31,500 bytes and each logical record 312 bytes.

Due to a maximum of two dropped physical records in the MAT copy process, occasionally a 1:1 MAT to DELMAT tape record comparison based on time-tagging will not be possible. In these isolated cases the user may either drop the mismatched data from further processing or, in the case of versions 1 and 2, only use corrections from a neighboring record.



EBCDIC TAPE FORMAT

Figure V -1. Standard Header (Physical Record Format)
(1 Character = 8 bits)

V. STANDARD HEADER SPECIFICATION AND TAPE DOCUMENTATION

V.1 GENERAL

All computer compatible tapes (CCT's) that are used as interfaces within NOPS require some form of identification. This applies to all CCTs that are currently defined by a NOPS tape specification, and that are also used for distribution or archiving purposes.

In addition to defining a "latest" product, data relating to previous products that went into the making of the "latest" product provides useful information when system problems occur.

The purpose of this revision to existing NOPS take specifications is to define a scheme that allows the recording of the genealogy of a "latest" product, and in general adheres to existing tape documentation standards.

In brief the system is as follows:

1. A documentation file that consists of a string of physical records follows the data on any tape defined by a current NOPS tape specification. This will be referred to as a Trailing Documentation File (TDF), and is the last file on a tape when it exists.
2. The standard NOPS header file remains as defined, with minor modifications to the standard header record that reflects both the existence of a TDF and adherence to the IPD standard for sequence numbers.

The following sections define the NOPS standard header records and file, and the TDF. Data files as currently defined in NOPS tape specification remain unchanged.

Character 1-12 =Software program name and version number.
Character 13-18 =Program documentation reference number, if it exists.
Character 20-126 =User defined comments that may be more relevant to the user than the preceding ones.

The NOPS standard header file will continue to consist of 2 records, the second being a duplicate of the first. Logical records 3 and 4 may be used for anything desired if no remake information is required.

V.3 TRAILING DOCUMENTATION FILE (TDF)

The TDF will consist of all NOPS standard header records (non duplicated) that relate to products that have gone into the making of the current product. Documentation records will be sequenced in accordance with their access; that is first in is the first recorded. Every TDF is 630 bytes in length.

The first record of this file will serve to identify the file as a TDF. This will be accomplished by placing asterisks in Characters 1 to 10 followed by NOPS TRAILER DOCUMENTATION FILE FOR TAPE PRODUCT T(SPEC NO (6 digits)) GENERATED ON DDD HH MM. The exact spacing of this comment is noncritical as long as it is less than 116 characters. The second physical record will be a repeat of the header file NOPS standard header record for this type with the proviso that data referring to the end-time are correct for the data set. Following physical records will be an accumulation of TDFs of all input tapes. For those products that require more than one tape, the TDF and the warning asterisk will appear on the last tape only.

The STD HDR will contain the following:

Two identical records (physical) of 630 characters (eight bits each followed by an end-of-file.)

The first 126 characters of the first record will consist of:

NIMBUS-7$_b$ NOPS$_b$ SPEC$_b$ NO$_b$ T (1-24 Character Count)
optional

Example: An ERB Matrix tape covering the month of February 1979 is generated SACC and sent to IPD for production of contour maps on 16 mm microfilm. The NOPS STD HDR file on the tape that IPD received would contain two of the following records.

*NIMBUS-7 NOPS$_b$SPEC$_b$ NO$_b$ T13403l$_b$ SQ$_b$ NO$_b$

lst day of time period

AA90321-2$_b$ ERB$_{bb}$ SACC$_b$ TO$_b$ IPD$_b$ START$_b$ 1979$_b$

032$_b$ 000432$_b$ TO$_b$ 1979$_b$ 059$_b$ 235742$_b$ GEN$_b$

1979$_b$ 104$_b$ 094500$_b$ followed by 504 blanks

First day of time period may not be first data day in the event of multi-day-stacked products that are based on an ILT week.

V.4 TAPE DUPLICATION

Because of the real possibility of an original tape being damaged in handling (resulting in the loss of many computations), each processing facility within NOPS will generate duplicate copies of master tapes. These duplicates will be delivered to IPD for data product generation or user copy generation and will be indicated by the characters "-2" added to the sequence number in the STD HDR. The original will be indicated by the characters "-1" and will be retained in a secure environment at the originating facility. When IPD returns copy #2 due to tape errors, a new copy will be sent to IPD with the same copy number, but identified on the tape cannister as "-2A", then "-2A", the "-2B" for a subsequent redo, etc.

V.5 SHIPPING LETTERS

IPD will include a shipping letter with every tape distributed. The shipping letter will be printed directly from the first 126 (or 138) characters of the first physical record of the Standard Header File (SHF). In the event of copies made from CCTs that are not generated in IPD, a new physical record reflecting IPD as the source and the Nimbus experimenter to whom the tape is being sent as the destination, will be added as the second record of the TDF. All existing records in the TDF will be pushed down, but none will be lost. This record should also replace those in the SHF.

VIII. LOGICAL DATA RECORD DESCRIPTIONS

Each logical record contains a combination of 2 major frames of data, orbital summaries, daily summaries or fill data. Figure 1 is the format for version 1 tapes (prior to November 1981) and Figure 2 is the format for version 2 tapes (November 1981 through October 1983), and Figure 3 is the format for version 3 tapes (November 1983 and following).

1. Physical Record Number (12 bits): This identifies the physical record within a data file. This number should range from 1 to approximately 28 for each day (file) of data.

2. Record I.D. (8 Bits): This identifies the record type, the last record written in a file and records in the last file in the tape. The MSB will be set to "1" if that record is the last one written in the file. The second MSB will be set on all records in the last file on the tape. The record type will use the 6 LSB of that byte to identify the type of record being used,

   51 = Logical Data Record
   52 = Orbital Summary Record
   53 = Daily Summary Record
   54 = Fill Data Record

3. Logical Record Number (8 Bits): This identifies the logical record within the physical record. The number ranges from 1 to exactly 200 for each physical record.

4. Year (16 Bits): The least two significant numbers of the calendar year (e.g., 82) for the first of the two corresponding MAT logical records.

5. Day of Year (16 Bits): The day of the year (1 to 366) for the first of the two corresponding MAT logical records.

6. Hour/Minute (16 Bits): The GMT hour and minute (100 *hours + minute) of the start of data for the first of the two corresponding MAT logical records.

LOGICAL DATA RECORD FORMAT

DELMAT Version 2

WORD	MSB 32				LSB 1	BIT
1	PHYSICAL REC. NO. (12)	SPARES (4)	FILE CONT (2)	REC. I.D. (6)	LOGICAL REC. NO.(8)	32
2	YEAR (16)		DAY OF YEAR (16)			64
3	HOUR/MINUTE (16)		GMT SECONDS (16)			96
4	ORBIT NO. (16)		STATUS WORD (16)			128
12	CHANNEL 11-14 (WPOV) UNCORRECTED MAT IRRADIANCES (256)					384
14	CHANNEL 13 MIDNIGHT OFFSET CORRECTIONS (64)					448
16	CHANNEL 13 LONGWAVE HEATING CORRECTIONS (64)					512
18	CHANNEL 13 SHORTWAVE HEATING CORRECTIONS (64)					576
20	CHANNEL 13 REPLACEMENT IRRADIANCES (64)					640
22	CHANNEL 14 MIDNIGHT OFFSET CORRECTIONS (64)					704
24	CHANNEL 14 LONGWAVE HEATING CORRECTIONS (64)					768
26	CHANNEL 14 SHORTWAVE HEATING CORRECTIONS (64)					832
28	CHANNEL 14 REPLACEMENT IRRADIANCES (64)					896
29	SOLAR ZENITH ANGLE (16)		LATITUDE (16)			928
30	LONGITUDE (16)		SPARES (16)			960
60	AS IN WORDS 1-30 BUT FOR MAT LOGICAL RECORD 1 (960)					

Figure 2 DELMAT format

7. GMT Seconds (16 Bits): The GMT seconds (0 through 59) of the start of data for the first of the two corresponding MAT logical records.

8. Orbit Number (16 Bits): The orbit data block number associated with the first of the two corresponding MAT logical records.

9. Status Word (16 Bits): This indicates the procedure used in obtaining the irradiance corrections for the first of the two MAT logical records. A detailed description is found in Appendix B.

10. Uncorrected MAT WFOV Irradiances (256 Bits): 4 irradiances * 4 channels * 16 Bits = 256 Bits. These are the uncorrected channel 11-14 WFOV irradiances copied without change from the first of the two MAT logical records. (Wm^{-2} with a scale factor of 10).

11. Channel 12 Clipping Corrections (64 Bits): 4 corrections *16 Bits = 64 Bits. Four irradiance correction terms for the first of the two corresponding MAT logical records. When added to the appropriate uncorrected MAT channel 12 irradiances, removes the sunblip contamination of the channel. Version 3.0 only. (Wm^{-2} with a scale factor of 10).

12. Channel 12 Replacement Irradiances (64 Bits): 4 irradiances *16 Bits = 64 Bits. Four irradiances which have been corrected for the effect described above for the first of the two corresponding MAT logical records. These are replacement irradiances for the channel 12 irradiances existing on the MAT. Version 3.0 only. (Wm^{-2} with a scale factor of 10).

13. Channel 13 Clipping Corrections (64 Bits): 4 corrections *16 Bits = 64 Bits. Four irradiance correction terms for the first of the two corresponding MAT logical records. When added to the appropriate uncorrected MAT channel 13 irradiance removes the sunblip

uncorrected MAT channel 14 irradiance removes the sunblip contamination of the channel, and in concert with other corrections, zeroes the channel at night. Version 3.0 only. (Wm^{-2} with a scale factor of 10).

19. Channel 14 Midnight Offset Corrections (64 Bits): 4 corrections * 16 Bits = 64 Bits. Four irradiance correction terms for the first of the two corresponding MAT logical records. When added to the appropriate uncorrected MAT channel 14 irradiances removes the zero-bias response of the channel. (Wm^{-2} with a scale factor of 10).

20. Channel 14 Longwave Heating Corrections (64 Bits): 4 corrections * 16 Bits = 64 Bits. Four irradiance correction terms for the first of the two corresponding MAT logical records. When added to the appropriate uncorrected MAT channel 14 irradiances removes the longwave heating response of the channel. (Wm^{-2} with a scale factor of 10). (Not used, always filled with 22222.)

21. Channel 14 Shortwave Heating Corrections (64 Bits): 4 corrections * 16 Bits = 64 Bits. Four irradiance correction terms for the first of the two corresponding MAT logical records. When added to the appropriate uncorrected MAT channel 14 irradiances removes the shortwave heating response of the channel. (Wm^{-2} with a scale factor of 10). (Not used, always equal to zero in versions 1.0 and 2.0).

22. Channel 14 Replacement Irradiances (64 Bits): 4 irradiances * 16 Bits = 64 Bits. Four irradiances which have been corrected for the effects described above for the first of the two corresponding MAT logical records. These are replacement irradiances for the channel 14 irradiances existing on the MAT. (Wm^{-2} with a scale factor of 10).

23. Solar Zenith angle (16 Bits): The solar zenith angle in degrees at the subsatellite point (0 to 180 degrees with a scale factor of 100) for the first of the two corresponding MAT logical records.

APPENDIX A: TAPE LENGTH ESTIMATE (version 1.0 and 2.0)*

File one will consist of a NOPS standard header record, written twice, and is called the Standard Header File. The two identical records each contain 630 bytes and are followed by a single end-of-file mark:

0.394 inches	= 630 Bytes/1600 BPI		(header record)
0.600 inches	=		(inter-record gap)
0.394 inches	= 630 Bytes/1600 BPI		(header record)
0.600 inches	=		(inter-record gap)
0.001 inches	= 2 Bytes/1600 BPI		(end-of-file-mark)
0.600 inches	=		(inter-record gap)
2.589 inches			

A set of files will then follow, each one corresponding to a single day of data. Each file will contain on the order of 30 physical records, each 24084 Bytes in length and corresponding to approximately $\frac{1}{2}$ orbit of data. For N data-days and assuming that each day contains 15 complete orbits of data (an overestimate):

N*451.575 inches	= 30*24084 - Bytes/1600 BPI		(data records)
N*18.000 inches	=		(inter-record gap)
N*0.001 inches	= 2 Bytes/1600 BPI		(end-of-file-mark)
N*0.600 inches	=		(inter-record gap)
470.176N inches			

The last file will consist of all NOPS standard header records that relate to products that have gone into the making of this product and is called the Trailing Documentation File:

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*For version 3.0, use 31500 bytes per physical record instead of 24084.

APPENDIX B: PROCEDURE STATUS WORD

A status word is created internally during the operation of the calibration adjustment software. It combines information from the MAT instrument status word, MAT data quality loss interval (DQLI) flags, interval irradiance quality control and gap fillings procedures.

The units digit gives quality information on the uncorrected MAT WFOV irradiances and has 3 values:

0 - All WFOV data for channels 12-14 is good.

1 - All WFOV data for channels 13-14 is good.
All WFOV data for channel 12 is bad.

2 - All WFOV data for channels 12-14 is bad.

The tens digit gives the cause of the problem:

0 - All WFOV data is good.

1 - DQLI Flags set.

2 - Go/No go heater is on.

3 - Electronic calibration is on.

4 - Channel 12 is shuttered.

5 - Channel 12 is narrow.

6 - WFOV data values are out-of-limits.

7 - WFOV data ranges are out-of-limits.

8 - Go/No go heater cool-down delay.

9 - Dummy data (should never exist external to the calibration adjustment software).

The hundreds digit describes how the corrected WFOV channel 12 irradiances were computed:

BIBLIOGRAPHIC DATA SHEET

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
CR 175299		

4. Title and Subtitle	5. Report Date
User's Guide and Tape Specification for ERB 7 DELMAT	March 1985
	6. Performing Organization Code: 636
7. Author(s): Philip Ardanuy, Lanning Penn	8. Performing Organization Report No.: Contractor 175299
9. Performing Organization Name and Address: Research and Data Systems, Corp., 10300 Greenbelt Road, Lanham, MD 20706	10. Work Unit No.
	11. Contract or Grant No.: NAS 5-27728
	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address: Goddard Space Flight Center, Greenbelt, MD 20771	14. Sponsoring Agency Code: NASA GSFC

15. Supplementary Notes

16. Abstract

This document provides guidance to the DELMAT user in the areas of purpose, use and limitations of DELMAT tapes and software. It also provides the DELMAT tape specifications. The ERB-7 ERB MAT and tape characteristics applicable to the DELMAT tapes are also summarized.

17. Key Words (Selected by Author(s))	18. Distribution Statement
Nimbus 7 User's Guide Tape Specifications, Software	Unclassified - Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	41	

*For sale by the National Technical Information Service, Springfield, Virginia

GSFC 25-44 (10/77)